Panasonic

THE PANASONIC HOME GATEWAY

Pilot Study: Pathways to Health with Jewish Home Lifecare

Impact of Telehealth on Quality Outcomes, Medication Adherence, and Patient Engagement

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Jewish Home Lifecare

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EXECUTIVE SUMMARY

In the last ten years, much has been written about the utilization, evolution and future of home telehealth or what is often referred to as remote patient monitoring. Many studies and research projects – some large, some small – have been conducted in the hope of validating the efficacy of the technology in the home as a valuable component of case management. With a few exceptions, it can be said that the studies confirm what is intuitive – home telehealth saves clinicians time, saves money through reduced utilization of health services and improves the quality of patient life through education, self-empowerment and improved self-management of disease.

This paper reviews the current health ecosystem, its dramatically changing landscape and illustrates how case management programs utilizing home telehealth technology, and specifically, the Panasonic Home Gateway, can impact the cost of health care in multiple stakeholder-settings by reducing costs associated with health services utilization while supporting high levels of quality outcomes, medication adherence and patient satisfaction.

Panasonic partnered with Jewish Home Lifecare, a New York City-based health care system with many years' experience in using multiple modalities of home telehealth products, to pilot their innovative introduction in the home telehealth arena. The joint venture – Pathways to Health – resulted in significantly lower rates of hospitalizations and emergency room visits while supporting high levels of medication adherence, patient satisfaction and system utilization. Pilot outcomes included:

- Hospitalizations
  - JHL cohort (dually eligible) – 69% less than the dually eligible average
  - Medicare Advantage cohort – 44% less compared to previous claims data
- Emergency room visits
  - JHL cohort (dually eligible) – 74% less than dually eligible average
  - Medicare Advantage – 43% less compared to previous claims data
- Medication adherence
  - 96-99% range
- Satisfaction
  - 95% satisfied or better
  - 100% would recommend to family or friends
  - 100% felt safer at home
- Utilization
  - 90.3 % patients used the tablet at least three times per week.

McKnight's Excellence in Technology Awards competition named Jewish Home Lifecare the 2014 Innovator of the Year for the Pathways to Health program use of the Panasonic Home Gateway (McKnight's, 2014).

These remarkable program results confirm and improve on those found in many other studies; however, from a fiscal perspective, there is a persistent concern with how home telehealth should

be financed. This paper reviews some of the major stakeholders that could benefit from the use of home telehealth and addresses the financial implications of implementing home telehealth programs to each stakeholder – Medicare, Medicaid, hospitals, Managed Care, ACO's and home health agencies. Each has a unique opportunity to benefit from incorporating home telehealth as part of their program operational design.

INTRODUCTION

The use of home telehealth or remote patient monitoring is proving to be a valuable tool in reducing the cost of providing care to a high need population while improving outcomes and sustaining or improving patient satisfaction with the experience of care.

The American health ecosystem is struggling to improve access to timely, quality care in the face of the growing demands of an aging population, an increasing number of people with chronic illnesses, fewer clinicians, and a healthcare system primarily focused on treating acute conditions. These pressures combined with consumer preference for "aging in place" are providing the stimulus for the adoption of new community based care models that will allow a patient to stay in their home and still receive quality care.

These pressures come at a time when the Affordable Care Act (ACA) reforms are changing the financial face of healthcare through payment reform and rebasing. These reforms are expected to increase consolidation among hospitals and downstream providers as they strive to provide higher quality, more efficient care.

Home telehealth, sometimes called remote patient monitoring, will play an increasingly critical role with the current evolution in health care delivery and reimbursement models. And while telehealth is widely known for its impact on improving quality and access to care, there is ongoing dispute over its value in economic terms. Who pays for it? There is no simple answer as the payer (or cost saver) in each health care setting may be different. As our health care settings and payers align, there will be shared savings; capitated payments will lead to economies of service; readmissions penalties and losses will incentivize methods to prevent readmissions. *All these roads lead to home telehealth as a valuable patient management technology.*

Jewish Home Lifecare's use of the Panasonic Home Gateway won the top award in the 2014 Innovator of the Year Category in the McKnight's Excellence in Technology Awards competition.

This paper will explore the current healthcare marketplace and its major stakeholders: Medicare and Medicaid; hospitals; managed care and home care agencies. In addition, it will discuss the savings telehealth, and in specific, the Panasonic Home Gateway, can bring to those different care settings.

PART I

HOME TELEHEALTH/REMOTE PATIENT MONITORING

The benefits of the many forms of telemedicine[1], and in particular home telehealth or remote patient monitoring (RPM), are well known. As part of a comprehensive, evidence-based care management process, early interventions based on changes in reported via a telehealth unit placed in an individual's home result in a reduction in hospitalizations and emergency room visits.

Home telehealth is expected to continue to transform and improve current practices in chronic disease care management. Daily reporting of vital signs reveals trends in patient biometrics. Prompts, reminders, and queries can assist patients in medication adherence. Educational features help patients learn to self-manage their disease through increased awareness of healthy diet and exercise. Improvement in self-management, knowledge and skills reduces health system utilization, keeping costs down. According to the Centers for Disease Control and Prevention (CDC, 2013), improved self-management of chronic disease results in an approximate cost-to-savings ratio of 1:10.

To capture data, monitoring technologies use a variety of wired or wireless peripheral measurement devices such as blood pressure cuffs, scales, and pulse oximetry. Some also permit video interaction/chat between the patient and health care professional. Some systems can prompt users to enter answers to targeted questions, and then use this information for data interpretation, provision of educational materials, as well as instructions such as scheduling an office visit or going to the nearest emergency room. Similarly, telehealth software systems can

[1] This paper will discuss home telehealth, as opposed to telemedicine, which is a broader term usually used in the context of physician's offices, clinics and hospitals.

transmit user-entered data; store the data in secure records systems accessible to clinicians; flag abnormal readings or responses; and alert clinicians to abnormalities via web dashboard, e-mail or text messages. In response to these alerts, clinicians can review data, follow up with patients, or take other appropriate actions. Although applications of the monitoring technologies are most often used in the home setting, a variation called a kiosk (multiple users) is used in congregate settings such as community-based senior centers, adult day care centers and nursing homes.

MAKING THE CASE FOR HOME TELEHEALTH

The estimated savings Litan (2008) projects from the use of home telehealth are encompassing and aggressive. He reports that up to $10.1 billion could be saved for all payers annually through the use of home telehealth with heart failure alone (Table A). Countless telehealth papers have attested to the savings their specific programs have incurred. The question at point; however, is to whom do these savings accrue? Who, beyond the Federal payers, have an interest and a potential role in achieving some of these savings? The second section of this paper will explore those questions.

TABLE A

Estimated Annual Savings from the Use of Home Telehealth (Litan, 2008)

	Heart Failure	Diabetes	COPD
Emergency Care (avoidance) Expense	$50 million	$0.1 billion	$.2 billion
Hospitalization (avoidance) Expense	$7.4 billion	$3.5 billion	$2.9 billion
Nursing Home (avoidance) Expenses	$2.7 billion	$2.5 billion	$1.8 billion
Total	$10.1 billion	$6.1 billion	$4.9 billion

THE PANASONIC HOME GATEWAY

PROGRAM RATIONALE

According to the International Journal of Behavioral Nutrition and Physical Activity (2014), cross-sectional comparisons across age groups suggest that as people get older, they tend to watch more television and become less active. Nielson (2014) reported that people over the age of 65 spend nearly 48 hours a week, about 7 hours a day watching television. This makes the television an ideal medium to reach an elderly population. The television is a critical part of most older person's lives, and thus makes an ideal medium to reach that population.

There are many models of home telehealth that offer different features and capabilities. Beyond the basic functions of vital sign monitoring and self-assessment queries, the Panasonic Home Gateway system was designed to address many of the issues inherent to the geriatric population: medication adherence, health literacy, self-engagement in health, poor eyesight and hearing, television use and sedentary lifestyle. Panasonic's television-based technical capabilities were embedded with the clinical evidence-based best practices of the Jewish Home Lifecare Telehealth Program.

Could a television-based product, coupled with a proven telehealth care management program, reduce hospitalizations while maintaining high levels of customer satisfaction, medication adherence and system utilization? The answer, as shown in the following pages, is a resounding "yes."

THE TECHNOLOGY

The Panasonic Home Gateway is a small box, similar to a DVD player, which connects to and utilizes patients' televisions as a medium to provide biometric monitoring, health self-

assessment surveys and educational videos to support disease self-management. The Gateway is accompanied by a specially designed remote control (Appendix C) that allows users to choose specific answers and options, such as health videos that can be displayed on the television. Data received is transmitted to a remote website via the internet, where it can be reviewed by a nurse. Data that is outside normal parameters is flagged to alert the nurse. The gateway software is customizable to allow for specific reports such as patient health and satisfaction surveys and aggregate as well as individual and aggregate responses.

PROGRAM DETAILS – OPERATIONAL DESIGN

Each morning at an individualized, preset time, participants receive a friendly video prompt on their television in (English or Spanish), reminding them to take their vital signs. Weight and blood pressure readings are then transmitted via Bluetooth to the television, and then to the Panasonic software portal via the internet. Heart failure patients with an additional diagnosis of diabetes are prompted to take their blood sugar readings using their own glucometer, and then asked to manually put the readings into the system. Patients may be reminded up to three times to take their vital signs if they don't respond to the first prompt, thus improving patient utilization of the technology.

In acknowledgement of the lower levels of health literacy as will be discussed in Part II, health videos were made available on demand. Patients can be encouraged to watch videos appropriate to their disease at least once as can their families.

Following the taking of the daily vital signs, patients were asked to answer a number of self-assessment questions related to their health status and symptoms. They were asked if they remembered to take their medication, and if not, why they didn't. They were regularly queried

about their satisfaction with the program, or asked questions related to their diet or lifestyle, such as smoking habits or doctor's appointments.

THE PATHWAYS TO HEALTH PROGRAM

Panasonic's partnership with Jewish Home Lifecare (JHL) enabled them to benefit from JHL's many years' experience with home telehealth. As part of their "Nursing Homes without Walls" program for dually eligible beneficiaries, JHL has long used a number of home telehealth product lines as successful interventions to keep fragile patients in their homes with the belief that home technologies not only prolong, but dramatically improve the quality of life through disease management, improved patient safety and confidence, reduced numbers of hospitalizations and emergency room visits. JHL was a key part of the Pathways to Health pilot development process, overseeing the pairing of the Panasonic technology with their proven telehealth processes.

THE TARGET POPULATION

The Pathways to Health Beta project targeted two population cohorts:

1. Dually eligible patients that were current enrollees in JHL's Lombardi, or Long Term Home Health Care Program (LTHHCP), also known as the "Nursing Homes without Walls" program; and
2. Medicare patients referred to JHL from Healthfirst, a major Medicare Advantage provider in the Metropolitan New York City area.

During the program, the LTHHCP patients, who were dually eligible, were transferred to the oversight of Managed Long Term Care Programs per New York State mandate (MRT 90, 2014).

Patients were all diagnosed with Stage III or Stage IV Heart Failure. Many patients had additional diagnoses, with diabetes being the most common. Several patients within the program also had a diagnosis of end stage renal disease, which made them extremely high risk for hospitalization.

The average age of the pilot participants was 75 years old with the JHL patients being, on average five years older. In addition, the JHL patients were predominantly female (80%), Hispanic or African American (80%) and Spanish speaking (65%). The Healthfirst population was approximately 65% female and 75% Caucasian, with almost all speaking English, with one patient speaking Creole. The participants from both cohorts were heavily concentrated in Bronx and Manhattan, with a few residing in Brooklyn.

These demographics are consistent with the differences between the dually eligible population and Medicare-only.

PROGRAM DETAILS - IMPLEMENTATION

To be eligible, patients needed to be diagnosed with Stage III or IV Heart Failure and at high risk for hospitalization. Both English and Spanish speaking patients were accepted.

Once a patient was screened as eligible and agreed to participate, Panasonic installers visited their home, installed the equipment and provided instruction on how to use the technology. Each patient then was visited once by a JHL nurse to assess the clinical appropriateness of the patient for the program, sign consents, reinforce the training and outline the patient responsibilities during the monitoring period.

Patients were subdivided into four cohorts:

- Heart Failure, English Speaking
- Heart Failure, Spanish Speaking
- Heart Failure with Diabetes, English Speaking
- Heart Failure with Diabetes, Spanish Speaking

Each cohort received daily prompting on the television to take their vital signs, followed by self -assessment health queries in their preferred language. Participants responded using the Panasonic remote control to choose selected answers. Questions were asked in large bold text shown on the television, easy for elderly eyes to see. The system's branching logic identified additional critical information related to pain status, medication adherence and supply and exacerbation of symptoms.

JHL nurses monitored and educated patients appropriate to their individual diagnosis and further reinforced education throughout the monitoring period. In addition, JHL nurses communicated with patients' case managers, keeping them appraised of the patient status. As it was a pilot with new technology, careful track was kept of patients' use, satisfaction and problems incurred with the equipment.

PROGRAM CHALLENGES

As with any pilot program, there were challenges that provided a learning experience for both organizations. The Panasonic-JHL implementation team met regularly to discuss and collectively solve clinical, technical, and any program operational issues as they appeared.

As many of the patients selected were dually eligible participants, introducing the program and maintaining the Gateway technology presented a number of challenges related to their age, tech "savviness" and in many cases, their socioeconomic status. The targeted population was generally a very febrile group – uptake during recruitment was slow at first and

often required multiple phone calls to explain the project, speak with family members and arrange for installation. Once scripts were provided for staff, uptake improved.

As the project matured and showed clinical successes, case managers directly referred a number of suitable candidates to JHL's telehealth department and in some cases asked for special consideration for high risk patients to be admitted as soon as possible.

The most significant technical challenge, once patients were recruited was the lack of internet connectivity. Some patients that did have internet did not know their password. As an intervention, mifi's or hotspots were installed to provide connectivity where needed, but a system-wide upgrade from one major provider resulted in a system wide failure of mifi's—all had to be replaced. In order to provide the best service and connectivity possible, the operations team began to use different service providers determined by patient location. Although the mifi's were overall a very successful intervention, some participants lived in "dead zones" or in high rises that did not receive adequate service and could not be admitted into the program..

Patients and their families sometimes interfered with the Gateway once installed, unplugging it to use outlets or television ports for games, VCRs or DVD. Mifi's were unplugged, television inputs were changed. Some patients with behavioral health issues were nervous about the LED lights embedded in the box; others were concerned about the cost of additional electricity usage.

Some fixes were easy. Power strips were provided. Aides and family members were trained to troubleshoot the simple problems, such as changing the television input. Lights were taped over; the cost of electricity was explained, mifi's were hidden behind the television, out of sight.

There was some attrition during the course of the study as a few participants proved to be unreliable, disinterested or in some cases, cognitively unable to participate. One participant advised she was going on vacation for a few weeks, but did not return until the study was nearly over.

Although there were multiple service calls for connectivity issues – most of which were caused by the participants or their families – no Gateways malfunctioned or had to be replaced during the course of the study.

The pilot results—gathered throughout the program as well as from formal exit interviews— provided valuable feedback that enabled Panasonic and JHL to institute technical and program refinements that overcame the majority of those challenges that surfaced during the program.

PROGRAM RESULTS

Thirty four patients met completion requirements for the program – being enrolled a minimum of 90 days within a six month period beginning January, 2014 and ending in July, 2014.

Throughout the program time frame, hospitalization and emergency room visits were analyzed on a monthly basis, as were medication adherence, and satisfaction related to technology ease of use, program in general and quality of life. Additional aggregate and individual trends were available for reporting as well and were used for clinical care management by the telehealth team.

Claims data was available for twelve Medicare Advantage (MA) patients from a managed care company and those patients were compared against their previous year with no adjustments made for exacerbation of disease over the course of one year. The remaining 22 patients were compared against the standard for dually eligible patients as determined by data published by the Kaiser Family Foundation (2012).

According to a brief on Medicare Policy from the Kaiser Family Foundation (Jacobson, et al. 2012), the dually eligible had higher hospitalization rates than Medicare (26% vs. 18%) and were more likely to have two or more hospitalizations (11% vs. 6%). They were also more likely to use the emergency room – 17% versus 12% for Medicare patients.

Percent Reduction (Hospitalizations) Achieved with Panasonic Home Gateway	
Medicare Advantage	*44.4%*
Dually Eligible	*69.2%*

Both cohorts showed remarkable reductions in hospitalizations as shown in Figure B. The Medicare Advantage group had **44%** fewer hospitalizations than they had the year before,[2] despite the normal progression of disease over the course of a year. JHL's dually eligible population had an average hospitalization rate of **8% - 69% less than the average rate of 26% for dual eligible beneficiaries.**

TABLE B

HOSPITALIZATION RATES – COMPARISON				
Cohort	Medicare Advantage Before Gateway-2013	Medicare Advantage With Gateway-2014	Dually Eligible Average 2012[3]	Dually eligible JHL Patients with Gateway 2014
Six month Hospitalization Rate	**18%**	**10%**	**26%**	**8%**
% Reduction/difference		**44%**		**69%**

See Appendix A, Chart 1 "Six Month Hospitalization Rate"

EMERGENCY ROOM VISITS

Emergency room visit rates were reduced in a manner similar to hospitalizations, as shown in Table C. Medicare Advantage rates were 43% lower; JHL patients 74% lower. Also see Appendix A, Chart 3.

[2] As this was a six month study, data was compared seasonally – the data from the first six months of 2013 was compared to the first six months of 2014 for Medicare Advantage patients.
[3] Data reported in Jacobson, (2012)

TABLE C

EMERGENCY ROOM VISITS - COMPARISON				
Cohort	Medicare Advantage Pre Gateway-2013	Medicare Advantage With Gateway-2014	Dually Eligible Average (2012)[4]	JHL patients with Gateway 2014
Six Month ER visit rate	9.70%	5.50%	17%	4.50%
Percent Reduction		**43%**		**74%**

MEDICATION ADHERENCE

Participants were reminded each day to take their medication and also were asked if they had taken their medications as prescribed. In contrast to studies related to overall medication adherence, participants generally indicated a high rate of adherence with their medication regimes, ranging from 96% at the beginning of the study to 99% in June 2014. However; each month, a significant percentage of those who responded "no" to the medication query additionally responded that the reason they did not was because they were out of their medication. This information was passed on to their care manager for a follow up intervention that ensured their prescriptions were refilled or renewed. During the course of the study, the percent of those that indicated they were out of their medications dropped, and at the same time, a slight, but noticeable trend upward was

The World Health Organization (2012) reports a general medication non adherence rate of 50% for those with chronic illness.

Study participants reported a 96%-99% rate of adherence to their medications. As medication is the primary treatment for heart failure, adherence is critically important to this population.

[4] **Data reported in Jacobson, (2012)**

evidenced in medication adherence as shown in Table D. See also Appendix A, Chart 5.

TABLE D

MEDICATION ADHERENCE						
Report Month	January	February	March	April	May	June
Adherent	97%	96%	97%	95%	98%	99%
Non Adherent	3%	4%	3%	5%	2%	1%

RESULTS: SATISFACTION

A monthly satisfaction survey was administered to all patients on the system using the dialogue feature of the Gateway. In addition, as the program reached the first phase of its completion, in-person exit interviews were conducted during equipment removal. The exit interviews were used to validate the electronically gathered data and to solicit additional feedback.

One hundred percent of participants responded they would recommend the Panasonic Home Gateway to family or friends.

One hundred percent said using the Gateway generally helped them manage their disease and feel safer at home.

85% of those who had used other telehealth systems said the Gateway was easier to use.

Overall, patients reported high rates of satisfaction with the program. During the program operation, 94% were either very satisfied or satisfied; exit interviews confirmed this level of satisfaction with a 95% satisfied or better report. One hundred percent of participants responded they would recommend the Panasonic Home Gateway to family or friends. One hundred percent said using the Gateway generally helped them manage their disease and feel safer at home. This was validated by the exit interviews.

Beyond the Data – Improved Case Management

Home telehealth programs have great value beyond the data received. Telehealth nurses, techs and installers add an increased layer of touch points with each person receiving monitoring.

Those touch points provide critical background information that can make the difference between a patient being at home or needing nursing home placement. For example, one patient needed a service call because her Gateway wasn't powered on. The technician visited her home and found a newly installed air conditioner was over-loading her living room electrical circuit and causing the breaker to blow. Also plugged into the same circuit was the individual's oxygen equipment. The patient reported it happened frequently and she often went days without air conditioning and oxygen before the building super powered the breaker back on.

To support the safety of the individual, cases such as these are reviewed by the program oversight team and referred to the appropriate case manager or responsible party for resolution as are cases where the telehealth nurse notes a repetition of concerns, such as falls or other adverse events. This additional layer of daily interactive monitoring allows for rapid interventions to avoid or reduce further patient adverse events.

Slightly more than half the participants had used other home telehealth systems; 85% said the Gateway was easier to use than others. Participants especially liked the service embedded in the television as it was easy for them to see and read. All but one participant liked the reminders. There were a few negative comments related to connectivity issues, many of which were caused by those participants themselves. A small sample did not like the repetitive nature of the health self-assessment questions, which is a common complaint amongst users of home telehealth.

Those who watched the embedded videos said they were helpful (83%) or somewhat helpful (13%). Those that did not watch the videos reported that they didn't know about them (25%), didn't think they needed them (18%), they were in the wrong language (18%) or "other" (42%). Only English videos were available for this pilot, which was a disadvantage as a significant proportion of the target population was Spanish speaking.

The exit interview confirmed what is commonly believed about home telehealth technology – the interaction with the telehealth nurse made the participants feel more

connected to their health care providers, not less (86% said they always felt more connected, 10% responded frequently). 100% of the responses indicated the nurse was always or frequently helpful in teaching them about their disease (See Appendix A, Chart 4).

PART II IMPLICATIONS OF THE RESULTS

The Panasonic Home Gateway concept of utilizing interactive television capability to monitor biometrics and patient symptoms has, in its Beta form, shown remarkable promise in its stated goal of minimizing hospitalizations while maintaining high rates of patient engagement and satisfaction. Coupled with the clinical oversight and friendly guidance and support provided by JHL Telehealth nurses, it extends the eyes, ears and touch of healthcare.

The Panasonic Home Gateway Beta Project showed significant reductions in hospitalizations and emergency room visits. The ultimate question; however, in today's healthcare environment is: is home telehealth financially sustainable? In the next sections, this paper will lay out the burden different payers bear related to the ever increasing health issues related to chronic illness.

Medicare and Medicaid, as Federal and State payers have a huge stake in corralling the spiraling cost of health care, and while there are many cost containment strategies – some incorporating technology, some not, it is evident that home telehealth/remote patient monitoring is a strategy to be taken seriously as a tool to be incorporated into the evolving practices of health care. The Panasonic Home Gateway, with its demonstrated reduction in hospitalizations and emergency room visits, coupled with patient engagement and satisfaction scores, has shown to be a serious contender in the battle to combat many of the concerns circling the provision of telehealth-based case management.

Managed care companies, especially Medicare Advantage or the soon to be developed FIDA plans have comparable stakes in the reduction of health system utilization. These fully

capitated plans are responsible for providing the full panel of services to elderly patients, including hospitalizations and will be developing strategies to subsequently minimize their risk. Home telehealth will fit well into these strategies .

Hospitals, with newly implemented readmissions penalties, must continue to develop strategies to reduce readmissions while partnering with community service providers to manage care across settings. These collaborative efforts are a prime opportunity for home telehealth technologies to bridge the potential gaps in care that occur during the discharge processes.

Medicare home care agencies have been a bed of growth and development for home telehealth and remote patient monitoring since the 1990's. First used in early video visit form to substitute for in person-nurse visits, home telehealth's monitoring of vital signs has shown to be an invaluable care support, allowing nurses to make clinically-driven visits and provide care interventions before they reach a crises point. These technologies will continue to evolve and target their audiences in a more sophisticated and diverse manner. The Panasonic Home Gateway was tested in this environment, receiving excellent outcomes and high satisfaction rates.

The second section of this paper discusses prominent stakeholders in the health care environment, including Medicare, Medicaid, hospitals, managed care and Medicare home health agencies, and how effective home telehealth systems, such as the Panasonic Home Gateway, can accrue savings for each of those stakeholders.

Health care is expensive.

In 2010, about one in five Medicare beneficiaries were admitted to a hospital, resulting in costs over 100 billion dollars. Among the 14 % of beneficiaries with 6 or more chronic conditions, over 60% were hospitalized, which accounted for 55% of total Medicare spending on hospitalizations.

Additional, post-acute care costs for the 14% of those who received them totaled $54.7 billion dollars (Rau, November 26, 2012).

STAKEHOLDERS

STAKEHOLDER: MEDICARE

Health care is expensive. In 2013, Medicare was responsible for 14% of the Federal Budget ($492 Billion). These payments were allocated per Figure E (See Appendix B, Chart 1).

Medicare beneficiaries with multiple chronic conditions (non-communicable illnesses that are prolonged in duration, do not resolve spontaneously, and are rarely cured completely) are the heaviest users of health care services. As the number of chronic conditions increases, so do utilization of health care services and health care costs (CDC, 2009).

TABLE E

MEDICARE BENEFIT PAYMENTS - $492 BILLION							
Home Health	Other Services	Medicare Advantage	Hospital Inpatient	Physician Payments	Outpatient Rx Drugs	Hospital Outpatient	Skilled Nursing
3%	14%	25%	24%	12%	11%	6%	5%

Among all Americans, the most likely to have chronic conditions are Medicare beneficiaries age 65 and older as about four out of five are affected by a chronic condition, such as heart disease and cancer, hypertension, stroke and diabetes (CDC, Health Aging, 2011). Research indicates that in 2008, two-thirds of all Medicare beneficiaries had at least two or more chronic conditions (CMS, 2011). Because the risk for multiple chronic diseases rises with age,

the prevalence of multiple chronic conditions is expected to grow even more as the Medicare population ages. Additional, post-acute care costs for the 14% of those who received them totaled $54.7 billion dollars (Rau, November 26, 2012).

The 30 day all cause readmission rate for all FFS beneficiaries was 19% compared to a rate of 25% for beneficiaries with 6 or more chronic conditions.

Medicare beneficiaries with multiple chronic conditions are the heaviest users of health care services. As the number of chronic conditions increases, in addition to the hospitalizations, there is a corresponding increase in overall health system utilization such as post-acute services and home health care. Likewise, as the number of chronic conditions increases, so do readmission rates. Compared to beneficiaries with 0 or 1 chronic condition, Medicare spending overall was 3 times greater for beneficiaries with 2 or 3 chronic conditions and 15 times greater for those with 6 or more chronic conditions (CMS – Chronic Conditions, 2011).

Emergency room visits follow the same trend, with a strong correlation between the number of chronic conditions and number of visits to the emergency room, with 70% of beneficiaries with 6 or more chronic conditions having at least one ER visit and over 25% having three or more visits.

An estimated 17% of Medicare beneficiaries have heart failure, accounting for 800,000 admissions annually (Advisory.com, April 4, 2014). Nearly one in four patients hospitalized with HF is re-hospitalized within 30 days of discharge. The American Heart Association (AHA) lists the major causes of hospital *re*admission as:

Rough analysis**: If 800,000 patients are admitted for heart failure at a cost of $15,000 each admission; and subsequently 25 % (200,000 patients) are readmitted at the Medicare cost of $33,000, the total cost of these events, based on Brown's figures is **$18,600,000,000 per year.

*If home telehealth is used as an intervention, reducing both admissions and readmissions by a conservative 20% each time, the total Medicare cost is reduced to $13,824,000,000, notwithstanding the cost of the intervention. A 40% hospitalization/40% re-admission reduction brings the patient re-admittance to 72,000, for a much lower total Medicare cost of **$2,376,000,000 per year.***

- 24% Diet non-compliance
- 24% Prescribed medication non-compliance
- 16% Inappropriate medication
- 19% Failure to seek care
- 17% other

According to Brown (2014) data shows that readmissions more than double the cost of providing care to a patient. On average, Medicare pays $15,000 in overall health system costs for an episode with no readmission and $33,000 for an episode with one readmit. The use of home telehealth to educate patients with low health literacy, support medication adherence and provide an additional layer of case management can result in exponential savings as seen in the inset text box.

CONCLUSION: MEDICARE

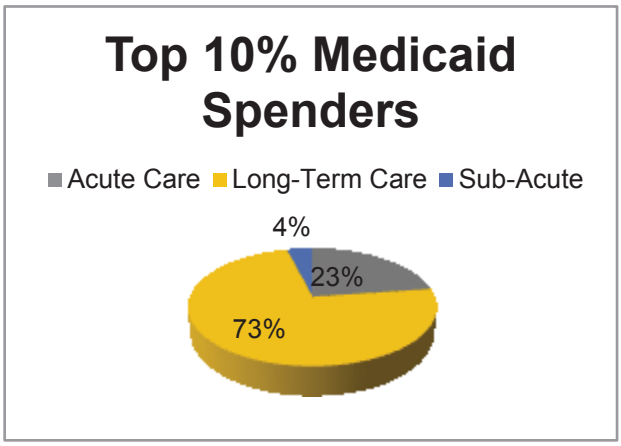
There is general consensus that many hospitalizations and subsequent re-hospitalizations can be avoided for the Medicare population. The Panasonic Home Gateway resulted in dramatic reductions in admissions and readmissions, similar to those in the rough analysis. To avoid the continual and potentially catastrophic increase in the cost of Medicare, effective strategies such as home telehealth, that promote disease self-management and reduction in utilization must be implemented.

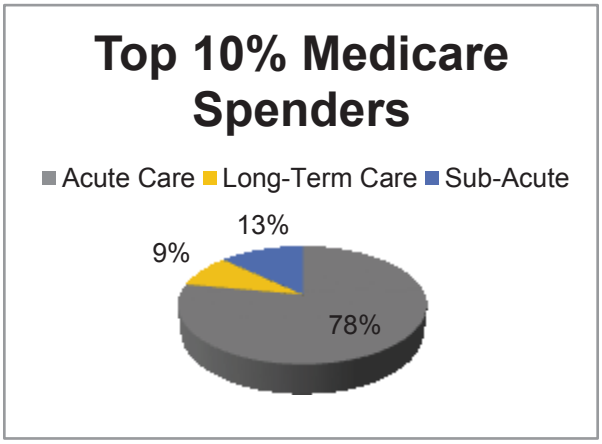
STAKEHOLDER: MEDICAID—THE DUALLY-ELIGIBLE POPULATION

Many of the highest cost, chronically ill patients are eligible for both Medicare and Medicaid and are called dually eligible beneficiaries, or what commonly called "dual eligibles" or sometimes simply as "duals." Policymakers are interested in finding ways to improve the delivery of care and reduce spending for beneficiaries because they are among the frailest and highest cost segments of the Medicare and Medicaid programs.

The dually eligible are low-income seniors and individuals with disabilities who rely on Medicare for coverage of acute care medical services and on Medicaid for financial assistance with Medicare's premiums and cost sharing. Most also rely on Medicaid to provide coverage for services not included in Medicare, particularly long-term care. They are among the poorest and sickest beneficiaries covered by either program and consequently account for a disproportionate share of spending in both programs. More than half have incomes less than $10,000, compared to only 8.3% of Medicare beneficiaries. They are less likely to be married and to be non-White. The dually eligible are much more likely to be living in an institution: one of six compared to only one out of 50 other Medicare beneficiaries reside in an institution (Kaiser Commission, 2012). This high rate of institutionalization has a critical impact on health care spending. In 2009, the federal and state governments spent a total of more than $250 billion on health care benefits for the nine million dually eligible population (CBO, 2013). The difference in health system utilization and associated costs is shown in the following charts.

CHARTS A & B (KAISER, 2012)





The dually eligible beneficiaries comprise 21 % of the Medicare population, but 31% of total Medicare costs, and 15 % of the Medicaid population, accounting for 39 % of total Medicaid costs (Jacobson et al. 2012; Young et al. 2012). As a group, they are similar in the sense that they tend to have low incomes and modest assets, but otherwise, they are quite heterogeneous, with a wide range of health problems and needs, requiring care from multiple types of providers in a wide range of settings.

According to Jiang et al, in a report for the Healthcare Cost and Utilization Project (2008), the dually eligible are more likely to be hospitalized than Medicare patients – 7.2% for heart failure, 101.2% for Diabetes, with heart failure being the leading cause of hospitalization among the chronically ill. The dually eligible are also in poorer health as seen in Table F.

TABLE F

Health Status of Duals vs Other Medicare[5]						
	Heart Disease	Diabetes	COPD	Mental Illness	Alzheimer's	Mental Retardation
Duals	29.3%	5.2%	25.1%	34%	5.7%	6.3%
Other Medicare	25.6%	0.5%	16.3%	16.8%	25%	0.6%

(See also Appendix B, Chart 2). As a result of their lower health status, the dually eligible have a higher level of health system utilization than other Medicare beneficiaries as shown in Table G.

TABLE G

Comparative Service Use[5]					
	Institutional Long Term Care	Skilled Nursing Facility	Inpatient Hospital	Outpatient Hospital	Physician Visit
Duals	16%	9.2%	26.1%	66.9%	65.8%
Other Medicare	0%	3.5%	15.1%	51.2%	62.8%

(See also Appendix B, Chart 2).

According to Wilding (2014), about 25% and Segal (2011); 26% of hospitalizations for dually eligible beneficiaries are preventable. Heart failure was the leading condition associated with a potentially avoidable hospitalization.

CONCLUSION: MEDICAID

In addition to the cost to federally funded Medicare, dually eligible patients add an additional burden to states that are responsible for those health expenses not paid for by

[5] Data from Urban Institute analysis of MSIS-MCBS 2007 as quoted in the Kaiser Commission Report on Medicaid and the Uninsured

Medicare. They have poorer health, lower socioeconomic status and higher rates of health system utilization, including high rates of expensive institutionalization. They are more likely to be hospitalized, and thus re-hospitalized. Home telehealth coupled with effective case management can delay nursing home placement, allowing individuals to stay safely in their homes. Dually eligible participants who participated in the Panasonic Gateway project, for example, had 69% less hospitalizations than the normal rate (as reported by Kaiser, 2010) of 26%.

STAKEHOLDERS: MEDICAID STATE POLICY AND FIDA

State Medicaid agencies must pay Medicare cost-sharing for most "dual eligibles." Further, most of the dually eligible are excused, by law, from paying Medicare cost-sharing, and providers are prohibited from charging them (Center for Medicare Advocacy, 2008), but the particulars are complex in traditional Medicare and become even more complex when a dually eligible beneficiary is enrolled in a Medicare Advantage (MA) plan.

Many states are looking to FIDA, or Fully Integrated Dual Advantage plans, a new type of managed care plan for certain dual eligible beneficiaries to reduce the growing cost burden to the state, of the dually eligible population, 73% of which is incurred in the long term care setting as shown in Chart A.

New York is a good example. The dually eligible are among New York State's costliest and most complex Medicaid beneficiaries. On average, each dual eligible costs the State $30,384 per year—the highest rate in the nation and twice as much as the national average of $15,459 (New York State Health Foundation, 2013). According to a presentation by Emblem Health (2013), New York State spends about $35 billion on an estimated 820,000 dually eligible

beneficiaries. Because of New York's comprehensive Medicaid long-term care benefit, the majority of Medicaid spending on the dually eligible in New York is for long-term care, and the majority of Medicaid's long-term care spending is for that specific population (Samis, 2012).

Under ACA, the federal government has funded 15 states, including New York, to develop FIDA demonstration programs. FIDA plans will care for dually enrolled beneficiaries through a full-capitation model in which a single managed care plan delivers all Medicare and Medicaid services. Meeting participant needs, including the ability to self-direct care, be involved in one's care, and live independently in the community, are central goals of this initiative (CMS 2013).

This shift in reimbursement model is important in that the FIDA plan will assume full responsibility for ***all*** healthcare costs incurred by the member. In other words, a FIDA member will essentially trade in all of their insurance cards – Medicare (Original or Medicare Advantage), Medicaid, MLTC, Medigap, and Medicare Part D – and only have one health plan – their FIDA plan. When fully implemented, the FIDA demonstration program could affect approximately 150,000 New Yorkers in the metropolitan New York City and surrounding areas (United Fund, 2012).

According to NY Health Access (2014), the New York State demonstration area includes dually eligible patients in New York City, Long Island, and Westchester County who:

- Receive or need managed long term care services - those adults age 21+ who receive or need community-based long term care services; and
- The dually eligible living in nursing homes or who come to be permanently placed in nursing homes.

The FIDA plan model is significantly different from the current partially capitated managed long term care plan (MLTC) currently serving the dually eligible population in New York in *that is responsible for all the patient's incurred healthcare costs***.** MLTC's are currently not responsible for the cost of hospitalizations, doctors' visits, medications (See Appendix B, Table 1) and therefore, have less incentive to provide clinically indicated preventive/avoidance services – Medicare picks up many of those costs. As the MLTC plans in the affected area migrate into FIDA plans, they will have increased incentives to implement telehealth as a cost savings case management tool, especially for those patients in the over 75, whose costs are more than twice as high for those 65-74 (Samis, 2012).

CONCLUSION: FIDA PLANS

Fully capitated FIDA plans will strongly benefit from home telehealth's proven record of chronic disease management success in reducing hospitalizations and emergency room visits.

STAKEHOLDERS: HOSPITALS

Hospitals, like hotels and other brick and mortar facilities, need to be fully occupied to economically self-sustain; however, new policies created under ACA result in hospitals having a significant stake in reducing readmissions.

As health care costs continue to rise and the population ages, policymakers are increasingly concerned about the growing burden of hospital-based medical care expenses on payers - the government, insurers, patients, and employers. Inpatient hospital services account for a small share of health care utilization (7 %) but constitute the largest share of total health care spending in the United States (29 % in 2009) (Kashihara and Carper 2009).

Cost of Readmissions

A simulation run by Reinforced Care (August, 2013) using CMS data, found that, for each of three diagnostic-related groups (acute myocardial infarction, heart failure and pneumonia) on which penalties depend, the prevention of a single readmission for heart failure saved the average hospital $8,200 (per each prevented admission).

The loss included the CMS penalty and the net cost of care.

According to Brown (2014), data shows that readmissions more than double the cost of providing care to a patient. On average, Medicare pays $15,000 for an episode with no readmission and $33,000 for an episode with one readmit. Hospitals themselves have a significant stake in preventing readmissions. A simulation run by Reinforced Care (August, 2013), using CMS data, found that, for each of three diagnostic-related groups (acute myocardial infarction, heart failure and pneumonia) on which penalties depend, the prevention of a single readmission for heart failure saved the average hospital $8,200 (per each prevented admission) for FY 2013 and FY 2014. The loss included the CMS penalty and the net cost of care.

THE HHRP. Section 3025 of the Affordable Care Act (ACA) added section 1886(q) to the Social Security Act establishing the Hospital Readmissions Reduction Program (HRRP), which requires the Centers for Medicare and Medicaid (CMS) to reduce payments to hospitals with excess readmissions, effective for discharges beginning on October 1, 2012. Initially, the program targeted Medicare patients who were hospitalized for heart attack, heart failure, or pneumonia. In the federal fiscal year 2015, CMS will expand the list of conditions to include elective total hip arthroplasty, total knee arthroplasty, and acute exacerbation of chronic obstructive pulmonary disease.

In December of 2013, CMS announced that hospital readmission rates were slowly declining (from a steady 19% between 2007 and 2011 to 18.5% in 2012) and attributed that decline to the HRRP. Preliminary claims data shows the Medicare readmission rate averaged less than 18 % over the first eight months of 2013 (CMS, 2013). This reduction; however, means that the pressure will continue to reduce readmissions as each hospital is measured against a collective benchmark.

Based on the perceived success of the HRPP, it is not unreasonable to expect that it is only a matter of time before the similar payment reduction/financial incentive programs already under consideration related to other modalities of care such as nursing homes (Mullaney, 2014) and home care (Blockberger-Miller, 2014) are implemented. This broad focus on reducing readmissions plus a payer focus on reducing hospitalizations in general will enhance the value of disease management models that show documented reductions in health system utilization.

CONCLUSION: HOSPITALS

The pressure on hospitals to reduce their readmissions rates will continue, most likely past 60 days and on to 90. As the penalty benchmarks inch downward, the pressure will accelerate, making chronic disease programs incorporating home telehealth invaluable – especially for those frequently readmitted patients.

STAKEHOLDERS: ACOS – ECONOMIES OF SCALE

As a result of the financial and quality outcome pressures created by ACA, consolidation has intensified across healthcare, encouraging mergers and acquisitions between hospitals, health systems, health plans, medical groups and post-acute providers. Some industry experts say the

consolidations allow for greater coordination to reduce unnecessary services and improve outcomes, as well as creating sufficient scale to manage the financial risks of new payment models, such as accountable care organizations (ACOs).

ACOs are legally formed collectives of doctors, hospitals, and other health care providers who work together to provide care to their Medicare patients. While there are several basic reimbursement models or payment arrangements, most center on shared savings (Punke, 2013), i.e., when an ACO succeeds both in both delivering high-quality care and spending health care dollars efficiently (by reducing unnecessary services and cost), it will share in the savings it achieves for the Medicare program. In Medicare's traditional fee-for-service payment (FFS) system, doctors and hospitals generally are reimbursed for each test and procedure. ACOs do not eliminate FFS, but do create an incentive to be more efficient by offering bonuses when providers keep costs down while achieving better health outcomes – thus encouraging a balance between high quality care and cost control. Bonuses are based on meeting specific quality benchmarks, focusing on prevention and carefully managing patients with chronic disease (Kaiser 2014).

CONCLUSION: ACOS

While the structures of ACO's vary – both legally and financially, home telehealth is an ideal tool to be used within the ACO framework as a central telehealth office oversight is invaluable during those transitions between collaborating partners, reducing costly and punitive readmissions.

STAKEHOLDERS: THE GROWING FOOTPRINT OF MANAGED CARE IN MEDICARE

Managed care has become a major player in the health reimbursement "payer" market for the elderly with Medicare Advantage now managing care for 15.7 million (Kaiser, 2014) or 30% of the Medicare-eligible market, with Medicaid managed care providing benefits to over 74% of Medicaid recipients (Kaiser, 2011) or 50 million people (Medicaid.gov, 2014).

Managed care, which had its roots in the early 20th Century, played only a modest role in the financing and delivery of health care until the 1970's, when the Health Maintenance Act of 1973 was enacted as a way to curb medical inflation through the encouragement of managed care plans (Fox and Kongstvedt, 2007). The Medicare Modernization Act (MMA) of 2003 created Medicare Advantage plans, which include an entitlement benefit for prescription drugs known as Medicare Part D. This coverage became effective on January 1, 2006 (CMS, February 2009). It should be noted that currently (and thus underlying the importance of medication adherence), prescription drugs account for 11% of the Medicare budget (Kaiser 2014).

Medicare Payment Policy Reversals Have Impact. Medicare pays Medicare Advantage plans a capitated amount per enrollee accounting for between 25% and 30% of total Medicare spending (Appendix B, Chart 1). As Medicare Advantage plans matured, Medicare payment policy shifted gradually from one that produced savings to one that focused more on expanding access to private plans and providing extra benefits to Medicare private plan enrollees. These policy changes resulted in Medicare paying private plans more per enrollee than the cost of care for beneficiaries in traditional Medicare (MedPAC, 2010).

Subsequently, ACA *reversed* the payment policy by reducing federal payments to Medicare Advantage plans over time, bringing them closer to the average costs of care under the traditional Medicare program. It also provided for new bonus payments to plans based on quality, or "5-Star ratings (Weiss and Pescatello, 2014) beginning in 2012, and required plans beginning in 2014 to maintain a medical loss ratio of at least 85%, restricting the share of premiums that Medicare Advantage plans can use for administrative expenses and profits (Kaiser Foundation, May 1, 2014). There is currently concern that the 5-Star rating system unfairly penalizes those Medicare Advantage plans serving primarily low-income and dually eligible individuals (who require more services), thus increasing the pressure on those plans to seek ways to provide less expensive oversight without sacrificing quality.

ROUGH ANALYSIS

Currently, Medicare pays for approximately one million hospitalizations for heart failure each year. The average cost of a hospitalization for the heart failure (Pfuntner et al. HCUP #146, January 2013) in 2010 was $10,500. Assuming 30% of those admissions fall within the realm of Medicare Advantage, which would account for 300,000 admissions for heart failure at $10,500[1].

Telehealth can substantially reduce those costs by lowering the rate of hospital admissions 20% to over 40% (Panasonic Gateway) as shown in Table H. These figures do not take into account the additional costs incurred by readmissions or the cost of the telehealth program.

TABLE H

Total cost of Medicare Advantage Heart Failure Admissions	$ 3,150,000,000.00
Savings with 19.7% reduction (VA - Darkins, 2008)	$ 620,550,000.00
Savings with 39.7 % reduction (Chen et al, 2011)	$ 1,250,550,000.00
Savings with 44% reduction (Panasonic Gateway)	**$ $1,386,000,000.00**

CONCLUSION: MEDICARE ADVANTAGE

Although projections for the growth of Medicare Advantage plans vary (Kaiser, 2013), enrollment has grown by 30% since 2010, and there is no doubt that it will play a significant role in the health care arena for the foreseeable future. As payment reductions, quality outcome bonuses and star ratings continue to pressure Medicare Advantage plans to provide more services while controlling costs, home telehealth coupled with effective case management will be a lucrative option.

STAKEHOLDERS: MEDICARE HOME HEALTH AGENCIES

Home health agencies provide nursing services, home health aides and services such as physical therapy, occupational therapy and social services. Medicare pays for home health services when they are medically reasonable and necessary and when an individual is confined to his or her home (homebound) and needs skilled nursing care on a part-time or intermittent basis, or physical or speech therapy, and in certain circumstances, occupational therapy. Roughly 9.6% of Medicare fee-for-service (FFS) beneficiaries (or 3.4 million individuals) used home health services in 2010. According to an article in Caring (2008), home care nurses, aides and therapists

drive more than 5 billion miles per year – many of those miles could be eliminated through the use of home telehealth/remote patient monitoring.

Medicare pays home health agencies under the Medicare Home Health Prospective Payment System (HH PPS) based on a standard sixty-day episode rate, adjusted for patient acuity and local labor costs.

Currently, reforms stemming from provisions of ACA will result in rebasing of reimbursement rates, which will most likely lead to cuts in payments to home care providers. The MedPAC Commission recommends further cuts, despite concerns over the fiscal health of home care providers, especially those rural and public agencies which show high losses. These fiscal pressures will heighten the need for agencies to find ways to provide higher quality services while reducing costs.

The major source of loss for providers is for the care of "outliers," or high cost cases (NAHC, 2011). Recent changes under ACA have reduced the rate for outlier payments and instituted a per agency cap for outlier payments. This negatively impacts those agencies that routinely serve high need patients, creating an additional strain on the financial health of home care agencies.

Home telehealth offers the opportunity to save home care agencies precious dollars by reducing staff utilization and improving quality of care. Typically, home visits are made on a formal, calendar-driven schedule. By incorporating telehealth monitoring into patient care, nurses are driven by clinical need rather than by calendar, generally saving needless visits.

According to CMS's Health Care financing Review (2012) Medicare Home Health agencies were paid an average of $3618 per episode for a patient with heart failure. According to the Medicare Cost report (2010, page 19), skilled nursing is responsible for 55% of the costs incurred by home health agencies during an episode. Centura (2008) reported a dramatic reduction in nurse visits resulting from the installation of telehealth – from 2-3 visits per week to 3 visits per 60 day episode. For the purpose of this paper, we will estimate a 50% reduction in Centura's nursing visits as an example of cost savings.

ROUGH ANALYSIS: TWO COST SAVINGS EXAMPLES[6]

(1) VNA of Western Pennsylvania documented a reduction - 14 visits for Heart Failure patients without telehealth and 11 for patients with telehealth within approximately the same episode length (Alston, 2009. This is a 21.4% reduction in nursing visit cost - or: $3618 Medicare payment x 55% = $1990 cost of skilled nursing. Minus a 21.4 % reduction in visit cost = $1564.01 cost of nursing or a $426 savings per patient per episode, minus the cost of technology.

(2) If Centura had a 50% reduction in nursing visits, their savings would be equal to $995 per patient per episode, minus technology cost.

With the understanding that not every patient is appropriate for home telehealth technology, in light of the current and more severe projected shortage in nurses and the pressure on agencies to reduce re-hospitalizations (including proposed readmissions penalties) while maintaining efficiencies and quality outcomes this savings is a compelling argument for home telehealth on its own merit. Based on these assumptions, reducing the number of visits per episode by even three would have critical impact on home care profitability.

[6] Agencies will of course, have varying reimbursements and costs associated with this rough analysis, but it demonstrates the value of considering home telehealth as a viable care management tool within each patient's "budget" or estimated payment.

CONCLUSION: HOME CARE

Additional financial pressures created by Medicare cuts to home care combined with labor shortages, potential readmissions penalties, competition for managed care contracts and increased focus on quality outcomes (such as home care compare star ratings proposed for 2016) create additional incentives for Medicare Certified Agencies to begin or expand the incorporation of home telehealth as a best practice.

CONTRIBUTING FACTORS: HEALTH CARE COSTS

Beyond the socioeconomic issues detailed previously in the differences between Medicare and dually eligible beneficiaries, there are additional contributing factors to the current cost of health care. These factors are universal across all healthcare settings and include the interface of human capital, human factors, regulatory and economic factors. The most important of these are medication adherence, health literacy, patient engagement/satisfaction and labor force.

COST FACTOR: MEDICATION ADHERENCE

Drugs are the primary treatment for heart failure but have limited effectiveness if patients are non-adherent to their medication regime (Hope et. al, 2004). According to the World Health Organization's (WHO) World Health Report 2003, quoted in (Wood 2012) the degree of medication non-adherence is so great and the consequences are of such concern that more people worldwide would benefit from efforts to improve medication adherence than from the development of new medical treatments. WHO also reports, according to Chisholm-Burns (2012), that the average non-adherence rate is 50% among those with chronic illnesses. The AHA (2010) reports that collectively, non-adherence to medication and inappropriate medications are responsible for 40% of hospital *re*admissions. Consequences of non-adherence include worsening condition, increased comorbid diseases, increased health care system utilization and potentially, death.

Chan, Nicklasan and Vial (2001) write that low medication adherence is increasingly being recognized as a dominant feature in elderly patients. In older adults, medication non-

adherence accounts for between 25% (CHAMP, undated) and 40% (McKesson, 2012, ESRD Network, undated) of nursing home admissions. Medication non-adherence results in an estimated 125,000 deaths annually, and costs between $100 billion (CHAMP, undated) and $289 billion (CDC, 2013) a year, depending on source, including approximately $47 billion for drug-related hospitalizations (CHAMP, undated).

In a study of elderly patients greater than 75 years of age Chan, Nicklason and Vial (2001), found that non-adherence, omission and cessation of drug therapy collectively accounted for 26% of hospital admissions. The most common causative drugs were cardiovascular drugs (48.4%) and the most common manifestations were falls, heart failure and delirium.

After adjusting for age, sex, race/ethnicity, education, alcohol use, cognitive measures, functional status, depression, and number of medications, (Berry et al, 2010) found that low medication adherence was associated with a 50% increased rate of falls compared with high medication adherence. According to HCUP (2010) data, among persons aged 65 and over, falls were the most common cause of injuries, accounting for 13% of all emergency department visits in 2008–2010 (U.S. Department of Health and Human Services, 2013). Average cost for ED expenditures, not including admissions to hospital, was $1062 for patients over the age of 65.

In an article in the American Journal of Health System Pharmacy, Hope et al. (2004) reported that medication non-adherence may be caused by patient's lack of health literacy and diminished skills and abilities. The article concluded that greater medication knowledge, skills, and adherence were associated with fewer ED visits in a study among patients 50 years of age or older with congestive heart failure in an urban, teaching medical center.

Reminder prompts and adherence queries, with optional dispensers embedded in home telehealth programs have shown to dramatically improve medication adherence. As noted earlier, the Panasonic Home Gateway system had a patient-reported medication adherence rate of between 96-99%.

COST FACTOR: HEALTH LITERACY

Inadequate literacy is especially prevalent among the elderly, the population with the largest burden of chronic disease and the greatest health-related reading demands. According to the National Adult Literacy Survey (2003) 38% of adults over 65 had intermediate health literacy, with 30% having basic and 29% having below basic health literacy. Only 3% had proficient levels of health literacy. This lower reading ability among older adults is most likely the result of age-related declines in information processing, and it is not explained by their having less education, a higher prevalence of chronic diseases, worse physical or mental health, or dementia.

A study of 3260 Medicare managed care enrollees that correlated the rates of hospitalizations with levels of literacy (Baker et al. 2002) found that the risk of hospitalizations was higher for individuals with inadequate literacy.

COST FACTOR: SATISFACTION WITH THE CARE EXPERIENCE

Simply put: health care is about the patient. Patient-driven care facilitates patient engagement, patient – provider communication and is instrumental to engaging the patient in their own health. Engaged patients have better outcomes; engagement is measured through patient satisfaction scores. According to an article in Health Affairs (February 13, 2014), a

growing body of evidence demonstrates that patients who are more actively involved in their health care experience better health outcomes and incur lower costs. As a result, many public and private health care organizations are employing strategies to better engage patients, such as educating them about their conditions and involving them more fully in making decisions about their care. Patient engagement is one strategy to achieve the "triple aim" of improved health outcomes, better patient care, and lower costs.

The Institute for Healthcare Improvement (IHI) has developed a framework that describes an approach to optimizing health system performance (IHI, 2013), defining three global dimensions of care as overall areas for needed improvements in healthcare settings. This framework for improvement includes:

- The patient experience of care (including quality and satisfaction);
- Overall population health; and
- Per capita cost of health care.

Although much of the focus on telehealth has been dedicated to cost savings achievable through the use of home telehealth, its use has been widely documented as a tool that supports and enhances both quality of, and satisfaction with care.

A paper written by Fazzi Associates (2008) on the future of technology and home telehealth concluded that using technology to connect the patient to the healthcare system in a tangible, visible manner generally accomplishes the following:

- Improved access to care;
- Satisfaction with the technology;

- Satisfaction with the related communication which may occur as a result of the telehealth monitoring; and
- Increased patient/caregiver involvement in managing their disease.

The VA provided various forms of telehealth and telemedicine care to 608,900 patients in 2013, according to a Department of Veterans Affairs report (Darkins, 2013). Overall, outcomes for patients receiving home telehealth services were positive with the average patient satisfaction being 84 %. Similarly, a poll of 200 Centura Health at Home patients indicated that approximately 86% (4.3/5) "completely agreed" that they would recommend telehealth. The Home Gateway system had extremely high rates of participant satisfaction as reported in Section 1.

COST FACTOR: LABOR SHORTAGES AND THE INCREASING DEMAND FOR CARE

The shortage of health care personnel as a global concern, especially in rural areas, is well documented (Bushy, 2006, Nebraska, 2009) and is expected to exacerbate due to the growth of chronic illnesses coupled with an aging population.

The U.S. Census Bureau projects the overall general population to increase by 13% between now and 2025. In 1900, the elderly (defined as persons 65 years or older) constituted just 4% of the U.S. population, according to the Federal Interagency Forum on Aging-Related Statistics (2012). By 2010, they represented 13%, growing in number from a population of 3 million to 40 million. Currently, there are close to 11 million elders who need assistance with at least one aspect of independent living (FORUM, 2012). A significant impact of this trend is that

those 65 or older use twice as many physician resources as those less than 65 (Dill and Salsberg, 2008).

According to the Bureau of Labor Statistics' Employment Projections 2012-2022 released in December 2013, Registered Nursing is listed among the top occupations in terms of job growth through 2022. The RN workforce is expected to grow from 2.71 million in 2012 to 3.24 million in 2022, an increase of 526,800 or 19%. The Bureau also projects the need for 525,000 replacements nurses in the workforce bringing the total number of job openings for nurses due to growth and replacements to 1.05 million by 2022 (BLS, 2013).

- According to the Paraprofessional Healthcare Institute (PHI), by 2020, the nation will need 1.1 million additional direct-care workers.
- The Association of Schools of Public Health (ASPH) projects a shortage of 250,000 public health workers by 2020.
- The American Geriatrics Society reports that the geriatrician supply in the United States is declining (down one-quarter to 7,000 since 2000), and predicts that demand will skyrocket as the population ages to 36,000 by 2030 (Zywiak, no date).

These collective shortages will undoubtedly impact the quality of patient care in the next ten years, while increasing competition for a shrinking labor pool. Health care organizations will subsequently have to increase wages and benefits to be competitive employers, thus increasing overall labor cost.

CONCLUSION: COST FACTORS

The causes of the rise in health care system utilization and the resulting costs are many and complex. Each factor has, in turn, its own complexities which further complicate both

understanding the problem at large and the solution or solutions. The previously discussed cost factors are four of the most prominent contributing factors that affect the future of health care costs. All could be mitigated, to some extent, with the use of home telehealth devices.

CONCLUSION

Home telehealth is coming of age. Within the current health care arena, a number of political, social and economic forces are aligning that will require changes in the way our health care is provided – changes that save nurse and physician time, improve quality of care, maintain high rates of patient satisfaction and save money.

Against this broader landscape of stakeholders and contributing cost factors, the Panasonic Home Gateway System was designed and tested as an technology that could, when coupled with evidence based best practices embedded in case management, provide cost savings through reduced hospitalizations and emergency room visits while maintaining high rates of patient satisfaction.

The joint project between Panasonic and Jewish Home Lifecare - Pathways to Health - produced excellent outcomes. A summary of outcomes includes (unless noted, data is for all patients):

- Hospitalizations
    - JHL cohort(dually eligible) – 69% less than the dually eligible average
    - Medicare Advantage- 44% reduction compared to previous claims data
- Emergency room visits
    - JHL cohort (dually eligible)– 74% less than dually eligible average
    - Medicare Advantage – 43% less compared to previous claims data
- Medication adherence
    - 96-99% range, all participants

- Satisfaction
    - 95% satisfied or better
    - 100% would recommend to family or friends
    - 100% felt safer at home
- Utilization
    - 90.3 % patients used the tablet at least three times per week.

These outcomes, when viewed through the lens of the current health care economic environment, clearly substantiate the overall value of using home telehealth as a critical tool in the care management process. Coupled with the many advantages a television-based product brings to an elderly health care cohort, the outcomes validate the Panasonic Home Gateway as a viable and effective product in the American home telehealth marketplace.

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APPENDIX A – RESULTS – PATHWAYS TO HEALTH

CHART 1 – SIX MONTH HOSPITALIZATION RATE

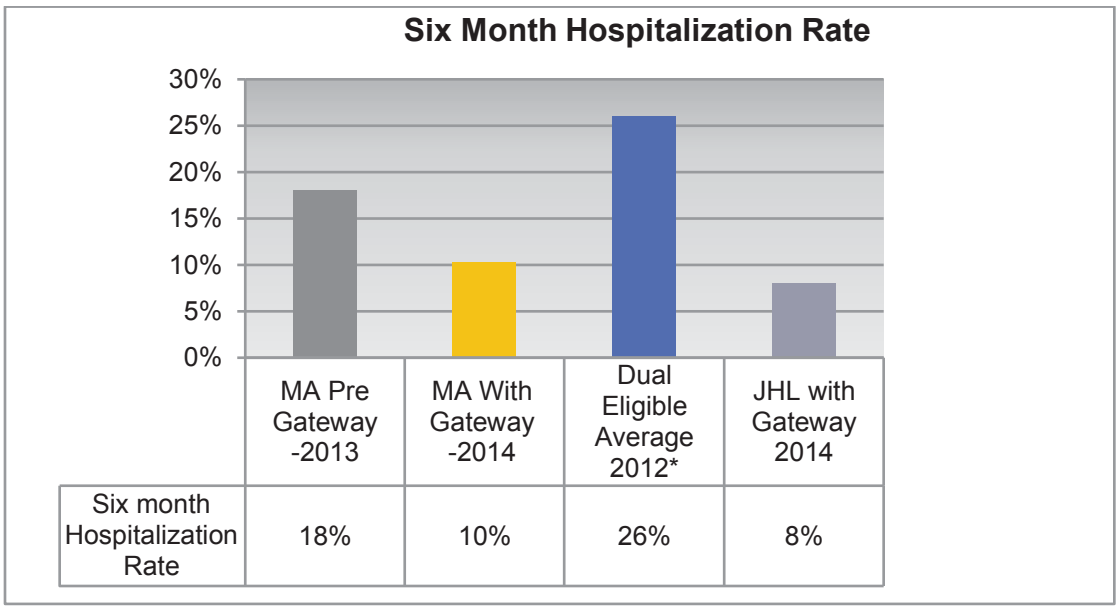


CHART 2 – GATEWAY REDUCTIONS

Reduction in Hospitalizations Achieved with Panasonic Home Gateway	
Medicare Advantage Cohort	**44.4%**
JHL Dually Eligible Cohort	**69.2%**

CHART 3 – SIX MONTH ER VISIT RATE

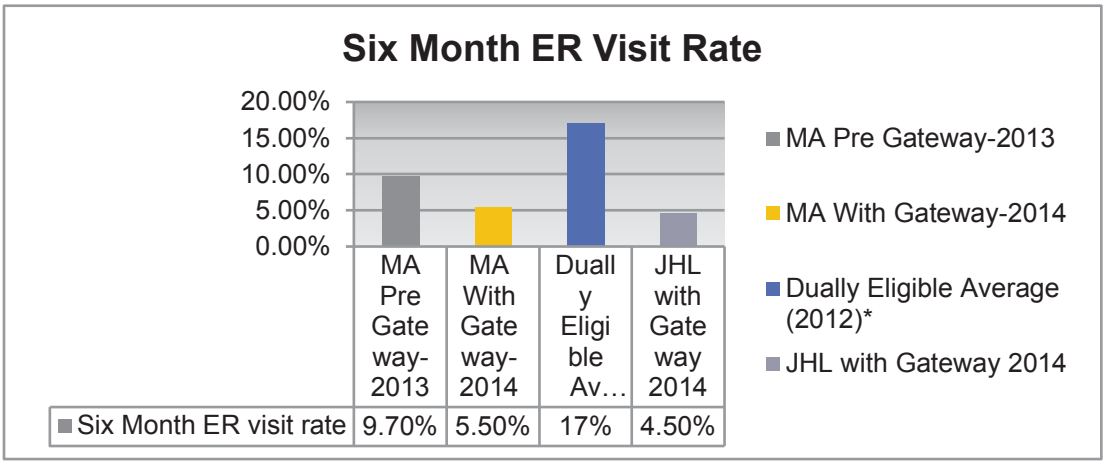


CHART 4 – GATEWAY SATISFACTION

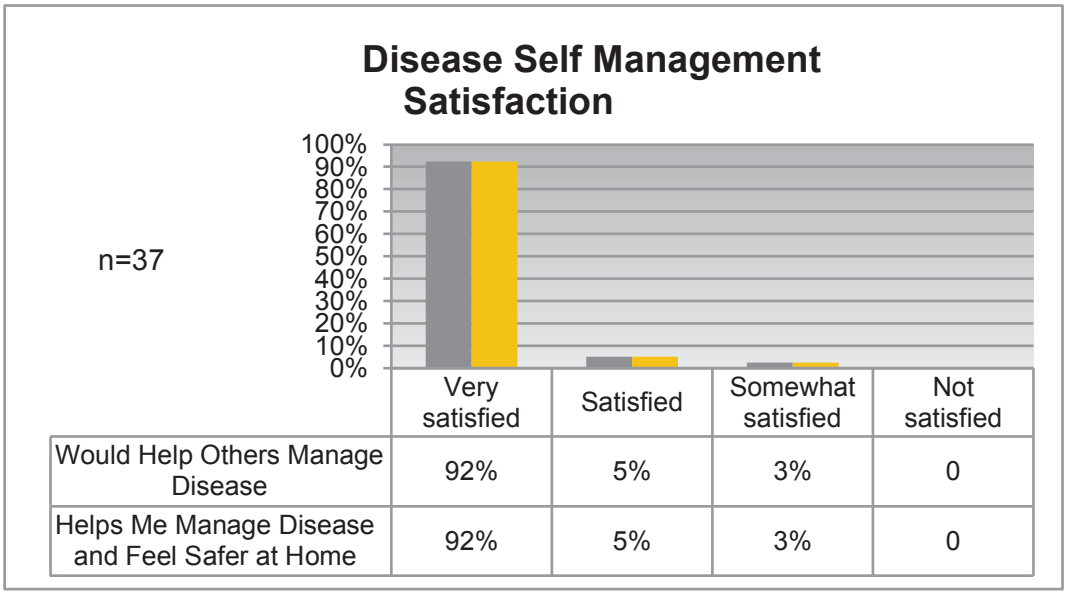


CHART 5 - ADHERENCE TREND IN MEDICATION

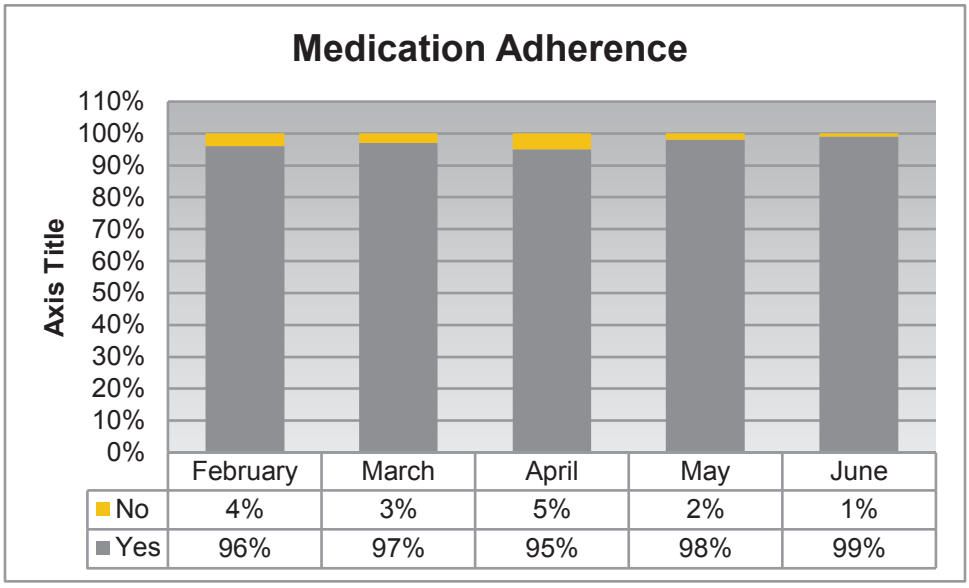
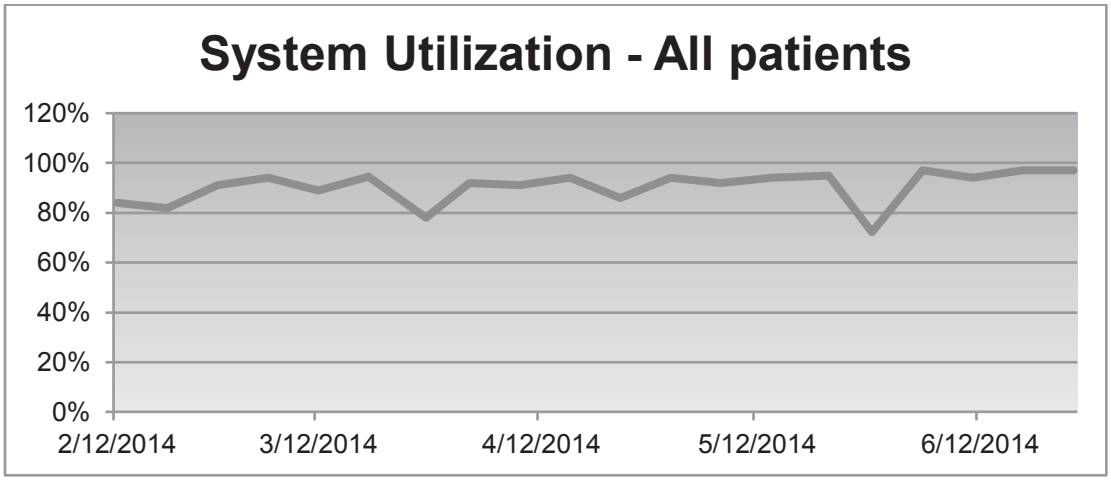


CHART 6 - SYSTEM UTILIZATION



APPENDIX B - STAKEHOLDERS

CHART 1- MEDICARE BENEFITS PAYMENTS

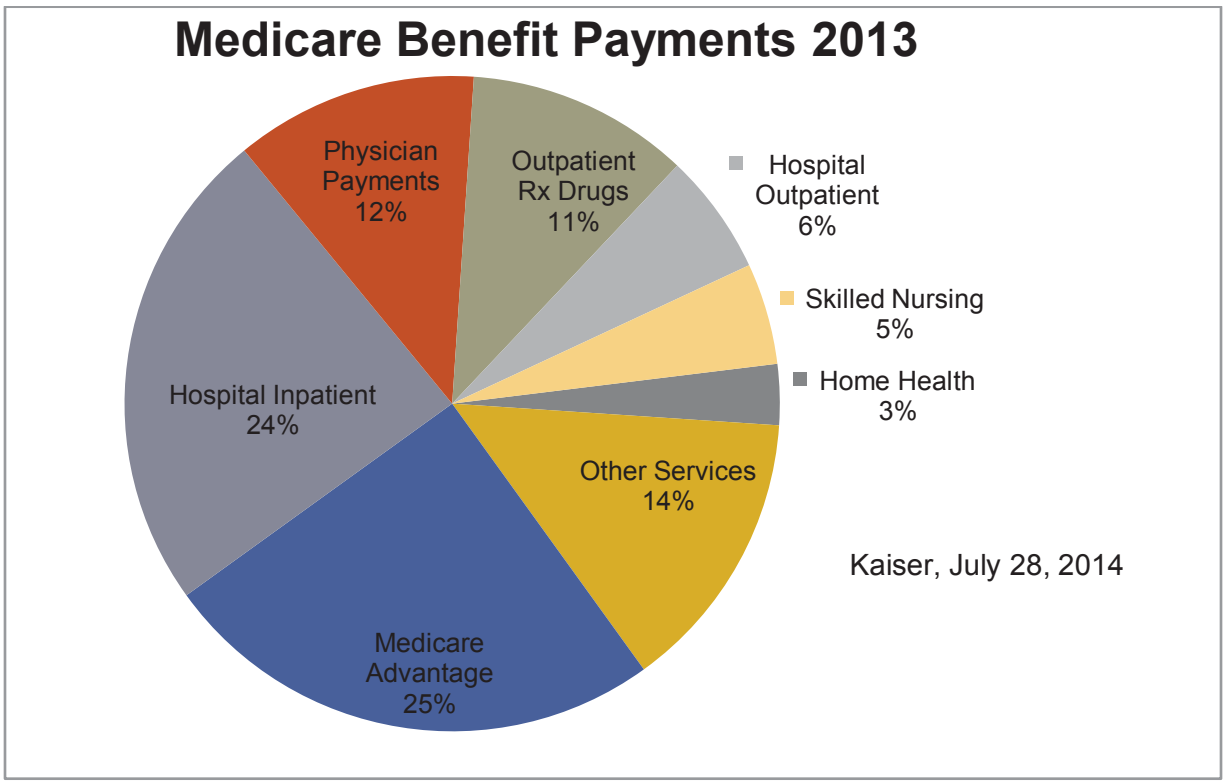
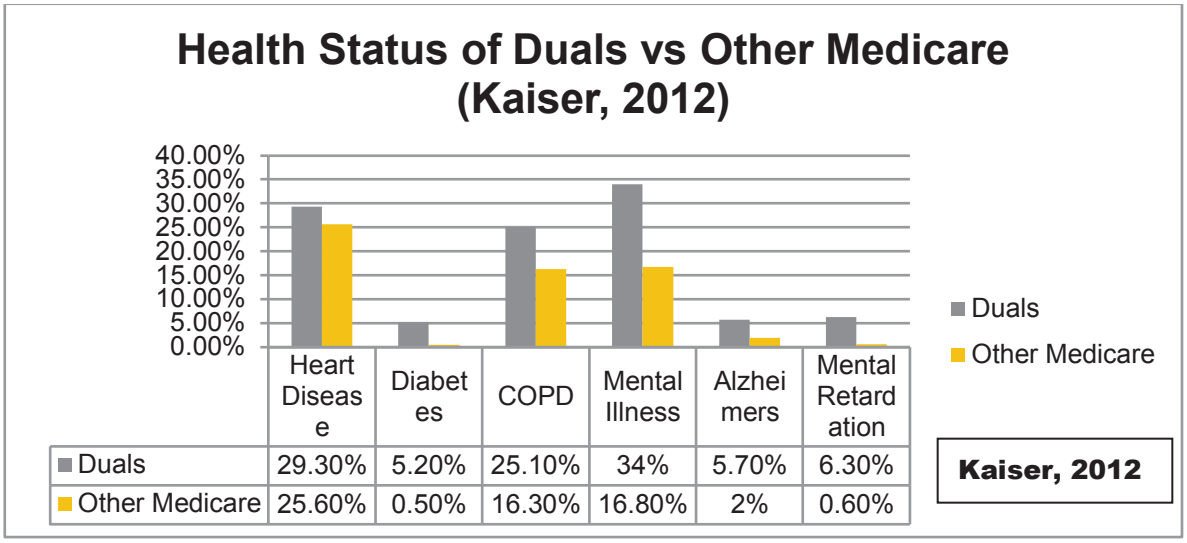
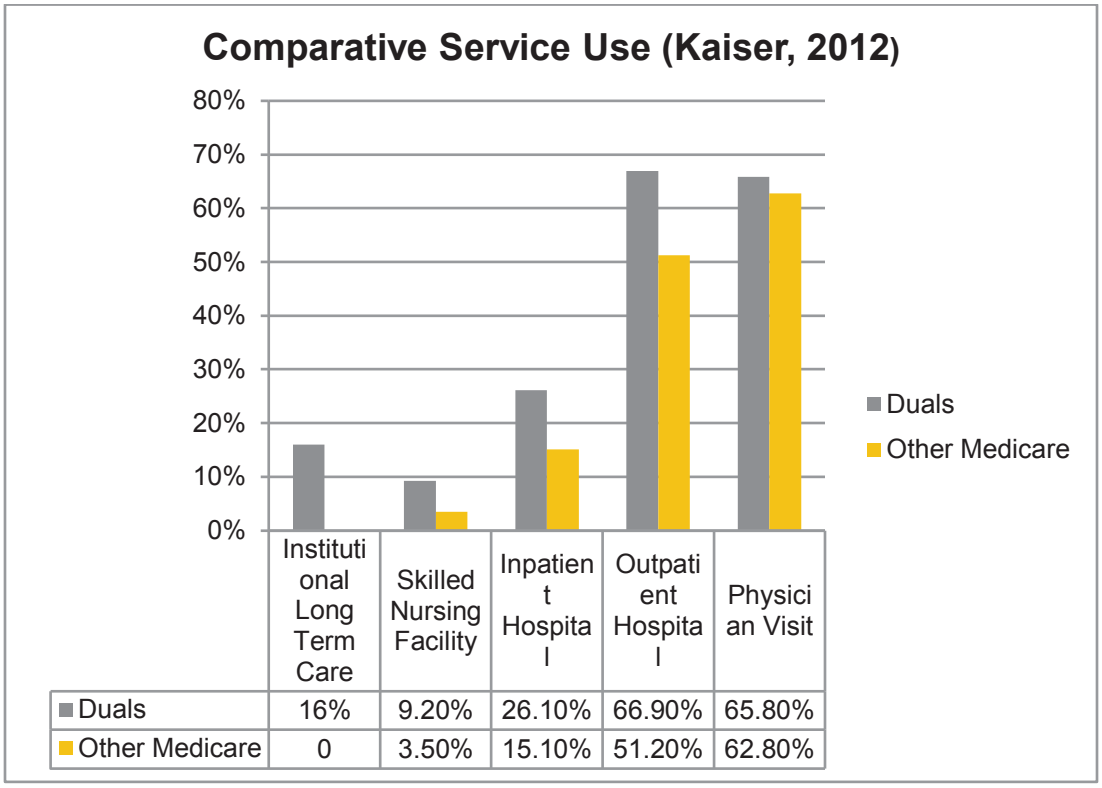


CHART 2 – HEALTH STATUS OF DUALS - COMPARISON



	Heart Disease	Diabetes	COPD	Mental Illness	Alzheimers	Mental Retardation
Duals	29.30%	5.20%	25.10%	34%	5.70%	6.30%
Other Medicare	25.60%	0.50%	16.30%	16.80%	2%	0.60%

CHART 3 – COMPARATIVE SERVICE USE



	Institutional Long Term Care	Skilled Nursing Facility	Inpatient Hospital	Outpatient Hospital	Physician Visit
Duals	16%	9.20%	26.10%	66.90%	65.80%
Other Medicare	0	3.50%	15.10%	51.20%	62.80%

TABLE 1 - MLTC COVERED SERVICES VS. MEDICARE COVERED SERVICES

Services Provided by Most Managed Long Term Care Plans	Medicare Services

• Care Management
• Health Services in the home
  ○ Nurses
  ○ Home Health Aides
  ○ Physical Therapists
  ○ Personal Care
  ○ Help with bathing, dressing, and grocery shopping
  ○ Nutrition
• Adult Day Health Care
• Social Day Care
• Nursing Home Care
• Specialty Health
  ○ Audiology
  ○ Dental
  ○ Optometry
  ○ Podiatry
  ○ Physical Therapy
• Other Services
  ○ Home-delivered meals
  ○ Personal emergency response
  ○ Transportation to medical appointments (non-emergency)
  ○ Medical equipment
  ○ Prostheses and Orthotics
  ○ Medical Social Services
	• Doctor office visits
	• Specialty care
	• Outpatient Hospital/Clinic visits
	• Inpatient Hospital stays
	• Mental Health services
	• X-ray and other Radiology services
	• Chiropractic care
	• Medicare Part D drug benefits
	• Ambulance services
	• Chronic Renal Dialysis

New York State Department of Health (2014). Managed Long term Care Covered Services. Internet citation accessed 8/10/2014 https://www.health.ny.gov/health_care/managed_care/mltc/coverservices.htm

APPENDIX C – THE PANASONIC HOME GATEWAY SYSTEM